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## GENERAL NOTES.

*A Man-Power Driving-Clock.*—The driving-clocks of modern equatorial telescopes are really instruments of precision, and mechanisms of wonderful accuracy, capable, frequently, of maintaining in motion a mass of many tons' weight with a movement so smooth and regular that for minutes at a time there will be no deviation so great as one second of arc. So perfectly does the modern ball-governor clock perform, that the astronomer of to-day has little realization of the mechanical imperfections in spite of which the astronomer of half a century ago managed to secure excellent observations. Perhaps the most unique driving-clock ever used was that employed for LASSELL's great four-foot reflector at Malta about 1860. To quote from the introduction to his "Observations of Planets and Nebulæ at Malta (*Mcm. R. A. S.*, **36**, 2, 1867) :—

"I have not attempted to carry on the telescope by a driving clock, properly so called; as the great weight, amounting to many tons on the bearings [the moving parts weighed about eight tons] makes it a difficult problem. I have, however, a system of wheel-work, terminating in a fly-wheel and winch-handle, which I might almost say answers equally well. The train is so regulated that to give the telescope a sidereal motion it is only necessary to turn this winch-handle once, accurately, in every second. A sort of skeleton clock, giving motion to a loud-beating pendulum, is placed adjacent to the handle, and it is the duty of an assistant (he may be merely a peasant) to take his place at this winch, giving it one revolution for every vibration of the pendulum. The fly-wheel, generally, insures the uniformity of each revolution, and a very short initial training is generally sufficient to enable the workman to make the revolutions perfectly coincident with the beats of the pendulum. In some respects this mode of driving is superior to the ordinary mode; for it ~~can~~ be instantly interrupted, or accelerated, or retarded at pleasure, when required for any special purpose. The amount of labor is not great, as it may be continued for hours without being oppressive."

One would like to know the peasant's opinion as to the labor involved in making thirty-six hundred regular motions per hour, even though no great force was used in each movement.

"Two assistants are all that the observer requires, and they are far from being constantly engaged. One or other of them (and they generally interchange during a long night's observation) is occupied pretty

constantly in driving the telescope,—the other, fitfully, in carrying on the [observing] tower, as the telescope retreats from it."

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*An Institute for Research in Theoretical Astronomy.*—So rapid has been the advance in recent years on the practical and observational side of astronomy that no fault can be found with present-day equipments and endowments. The same cannot be said for existing provisions for research in celestial mechanics. Here the disproportion between the number of problems awaiting research and the funds available for carrying on such studies is very great. The layman (and perhaps not a few practical astronomers as well) has but slight idea of the amount of work which is necessary to carry through the larger problems of research in theoretical astronomy, involving the work of master minds in the very limits of mathematical analysis in the first stage, the transforming of these theories to forms suitable for computation as the second, and frequently years of work by computers as the final stage. To mention only one problem: the task of keeping track of the asteroids is becoming a very serious one, and it alone now needs the services of a large and highly trained staff of astronomers.

The Committee on the Minor Planets of the *Astronomische Gesellschaft*, to meet this need, has outlined in the last number of the *Vierteljahrschrift* a plan for a Research Institute of Theoretical Astronomy.

Great as is the need for such a bureau of research, we fear that some time may elapse before the hopes of the committee may be realized. The plan is an ambitious one; the staff would, as planned, consist of eight theoretical astronomers, ten high-grade computers, thirty routine computers.

The annual budget would total about \$50,000, the building would cost about \$125,000, and the large sum of \$25,000 is specified for computing machines. An endowment of approximately \$1,400,000 would be necessary to carry out the scheme on the lines indicated.

A good suggestion is given in the Oxford Notes of *The Observatory* for October, 1913, in discussing the subject of the proposed Research Institute:—

"Need they [the theoretical astronomers and computers], however, be collected into a single institute? This centralization raises many difficulties, especially the national one of where the institute is to be placed. . . . The striking feature of astronomy is the number of small observatories scattered over the globe, many of them at present doing little good. Cannot these existing resources be used in some way? The work of discussion can often be best done single-handed, and computations can be parcelled out. Some unifying principle or sentiment is perhaps necessary; but it should not be beyond the powers of the *Astronomische Gesellschaft* to supply this, as it has already done in the case of the *Meridian Catalogues of 1875*."

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Professor A. OBRECHT has been appointed Director of the Santiago Observatory as successor to the late Dr. RISTENPART.

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Prince GALITZIN has become Director of the Observatoire Physique Central Nicolas, St. Petersburg.

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MINUTES OF THE MEETING OF THE BOARD OF DIRECTORS OF THE  
ASTRONOMICAL SOCIETY OF THE PACIFIC HELD ON NOVEMBER  
29, 1913, AT 2:00 P. M., IN THE ROOMS OF THE  
SOCIETY, 752 PHELAN BUILDING, SAN FRANCISCO.

There were present Vice-President R. G. AITKEN and Directors C. S. CUSHING, R. T. CRAWFORD, S. D. TOWNLEY, J. COSTA, A. J. MARKWART, F. V. CORNISH, and D. S. RICHARDSON. The proxy of Director GEO. E. HALE was held by Vice-President AITKEN.

The principal business before the meeting was the award of the Bruce Medal for the year 1914, announcement of which will be made later.

The attention of the Board was directed to the fact that Berlin, one of the nominating observatories under the Bruce Medal statutes, had failed for several years to make any nominations and the Secretary was instructed to write to the Director of that institution inquiring if Berlin desired to surrender its function as a nominating observatory.

The Treasurer reported that, under date of October 1, 1913, three Sunset bonds owned by the Society had been called in, the price paid for same being 105 and the amount realized in cash being \$3,150.

On motion of Director TOWNLEY, seconded by Director CORNISH and unanimously carried, the Finance Committee was authorized to re-invest this sum in approved bonds and allot same to the respective funds affected by the surrender of the Sunset bonds.

On motion of Director TOWNLEY, Mr. F. E. BRASCH was unanimously elected a member of the Society.

The following report of the Committee on the Comet-Medal was received and placed on file:—